CLAIMS

1. A radial turbine comprising: a scroll which forms a combustion gas flow path for guiding a combustion gas generated in a combustor to a nozzle; a nozzle which injects the combustion gas to a radial impeller on an inner side in a radial direction of a rotary shaft; and a shell which covers the nozzle and the impeller and forms the combustion gas flow path, characterized by comprising:

an air flow path formed between outside air in a substantially airtight state;

an air take-in hole which takes in air into the air flow path from the outside;

a blow-off hole which guides a part of the air taken into the air flow path, into the combustor; and

a through-hole which injects the other part of the air taken into the air flow path to a vicinity of the nozzle in the combustion gas flow path.

2. The radial turbine according to Claim 1, characterized in that the air flow path is formed to cover an outer side of the combustion gas flow path communicating from the combustor to the shell.

3. The radial turbine according to Claim 1, characterized in that the air flow path is formed to cover an outer side of the combustion gas flow path communicating from the combustor to the shell, and the through-hole is formed in a wall of the shell to

communicate between the air flow path, and an upstream of the nozzle of the combustion gas flow path.

4. The radial turbine according to Claim 1, characterized in that the through-holes are formed in both walls of the shell sandwiching the combustion gas flow path to penetrate the both walls of the shell from the air flow path to communicate with the combustion gas flow path.

5. The radial turbine according to Claim 1, characterized in that a plurality of the through-holes are arranged in parallel along a flowing direction of the combustion gas flow path.

6. The radial turbine according to Claim 1, characterized in that the nozzle includes a circular blade cascade in which a number of blades are arranged in a row in the circumference of which center is a turbine rotary shaft, and each through-hole includes a plurality of shell through-holes along a surface of each blade of the circular blade cascade.

7. The radial turbine according to Claim 1, characterized in that the through-hole includes a through-hole which tilts in a flowing direction of the combustion gas flow path and penetrates a wall of the shell.

8. The radial turbine according to Claim 1, characterized in that the nozzle includes a circular blade cascade in which a number of blades are arranged in the circumference of which center is a turbine

rotary shaft, and the through-hole includes a plurality of shell through-holes along a surface portion of each blade of the circular blade cascade, the shell through-holes tilting in a flowing direction of the combustion gas flow path.

9. The radial turbine according to Claim 1, characterized by further comprising: a through-hole which leads from one side of the air flow path sandwiching the combustion gas flow path to the other side of the air flow path while penetrating a wall of the shell, a blade thick portion of the nozzle and a wall of the shell on the other side; and a leakage hole which leads from the blade thick portion of the nozzle of the through-hole to a surface of the nozzle.

10. A radial turbine comprising: a combustor liner which mixes and combusts compressed air and a fuel to generate a combustion gas; a turbine scroll which forms a combustion gas flow path for supplying the combustion gas generated in the combustor liner to a turbine nozzle; a turbine nozzle which accelerates the combustion gas toward an inner side in a radial direction of a rotary shaft and supplies the combustion gas to a radial turbine impeller; and a turbine shell which covers the turbine nozzle and the radial turbine impeller, characterized by comprising:

an air flow path formed between outside air in a substantially airtight state;

an air take-in hole which takes air into the

air flow path from the outside;

a blow-off hole which guides a part of the air taken into the air flow path, into the combustor liner; and

a through-hole which injects the other part of the air taken into the air flow path to a vicinity of the nozzle in the combustion gas flow path.

11. The radial turbine according to Claim 10, characterized in that the air flow path is formed by a turbine casing so as to cover an outer side of the combustion gas flow path communicating from the combustor to the shell and to maintain air-tightness with respect to the outside air.

12. The radial turbine according to Claim 10, characterized in that the air flow path is formed to cover an outer side of the combustion gas flow path communicating from the combustor to the shell, and the through-hole is formed in a wall of the shell to communicate between the air flow path, and an upstream of the nozzle of the combustion gas flow path.

13. The radial turbine according to Claim 10, characterized in that the through-holes are formed in both walls of the turbine shell sandwiching the combustion gas flow path to penetrate the both walls of the turbine shell from the air flow path to communicate with the combustion gas flow path.

14. The radial turbine according to Claim 10, characterized in that a plurality of the through-holes

are arranged in parallel along a flowing direction of the combustion gas flow path.

15. The radial turbine according to Claim 10, characterized in that the turbine nozzle includes a circular blade cascade in which a number of blades are arranged in a row in the circumference of which center is a turbine rotary shaft, and the through-hole includes a plurality of turbine shell through-holes arranged along a surface portion of each blade of the circular blade cascade.

16. The radial turbine according to Claim 10, characterized in that the through-hole includes a through-hole which tilts in a flowing direction of the combustion gas flow path and penetrates a wall of the turbine shell.

17. The radial turbine according to Claim 10, characterized in that the turbine nozzle includes a circular blade cascade in which a number of blades are arranged in a row in the circumference of which center is a turbine rotary shaft, and the through-hole includes a plurality of turbine shell through-holes along a surface portion of each blade of the circular blade cascade, the turbine shell through-hole tilting in a flowing direction of the combustion gas flow path.

18. The radial turbine according to Claim 10, characterized by further comprising: a through-hole which leads from one side of the air flow path sandwiching the combustion gas flow path to the other

side of the air flow path while penetrating a wall of the shell, a blade thick portion of the nozzle and a wall of the shell on the other side; and a leakage hole which leads from the blade thick portion of the nozzle of the through-hole to a surface of the nozzle.

19. A method of cooling a nozzle of a radial turbine including the steps of: guiding a combustion gas from a combustor to a nozzle through a combustion gas flow path including a scroll; and injecting the combustion gas to a radial impeller on an inner side in a radial direction from the nozzle, comprising the steps of:

taking in air from the outside into an air flow path formed outside the combustion gas flow path in a substantially airtight state with respect to outside air;

guiding a part of the air taken into the air flow path, to the combustor; and

injecting the other part of the air taken into the air flow path, to a vicinity of the nozzle in the combustion gas flow path.

20. The method of cooling a nozzle of a radial turbine according to Claim 19, characterized in that the step of injecting the air to the vicinity of the nozzle in the combustion gas flow path includes a step of injecting the other part of the air along a surface of a blade forming the nozzle.